

1 **Amendment to the Drawings**

2 **In the Drawings:**

3 Applicant hereby submits new FIGURES 16, 17A, 17B, 17C, 18A, 18B, and 18C. These
4 Figures are being imported from the parent application, and do not represent new matter.
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1 REMARKS

2 Status of the Claims

3 Claims 1-14, 16-18, 22-24, 26, and 71-77 are now pending in the present application,
4 Claims 19-21 having been canceled in the present amendment, Claims 15 and 25 having been
5 previously canceled, and Claims 27-70 having been canceled as non-elected inventions in response to
6 a previous restriction requirement. Claims 1, 4, 17, 18, 22, 24, 71, 75 and 77 have been amended in
7 this Preliminary Amendment, to more clearly define the invention.

8 Priority Claim

9 The present invention was filed while U.S. Patent No. 6,537,506 (hereafter referred to as the
10 '506 patent) was copending, and both the '506 patent and the present invention have common
11 inventors. The present invention was developed based on the work resulting in the '506 patent, and a
12 claim to priority in the '506 patent has been made in the present amendment. While this claim to
13 priority has been filed later than is customary (generally such claims are made at the time of filing, or
14 perfected within the later of four months from the actual filing date of the later-filed application, or
15 sixteen months from the filing date of the prior-filed application), Rule § 1.78 clearly states that when
16 the later filed patent application was filed before November 29, 2000, those time limits do not apply.
17 Because the present application was filed on May 24, 2000 (i.e., before November 29, 2000),
18 Rule § 1.78 permits such a late claim of priority to be made.

19 Amendment to the Specification

20 Having made a claim to priority in the '506 patent in the current amendment, applicants have
21 incorporated disclosure from the '506 patent relating to an exemplary stacked plate reactor. In
22 particular, the disclosure from the '506 patent that is incorporated by amendment of the present
23 application can be found in the '506 patent at column 7, line 59 through column 9, line 32; and at
24 column 19, line 50 through column 23, line 58.

25 The text added to the specification of the present application differs slightly from the text in the
26 '506 patent, primarily due to changes in the numbering of the drawings and reference numerals required
27 for consistency with the numbering in the present application. However, it should be noted that the
28 amendment includes the following sentence, which is not textually articulated in the '506 patent:

29 *In an exemplary reactor, no openings penetrate the peripheral edges defining the perimeter of*
30 *the simple plates, and fluid passages used to implement heat exchangers are not in fluid*

1 *communication with fluid passages for reactants or products, or fluid passages corresponding to*
2 *reaction volumes and mixing volumes.*

3 This additional sentence does not introduce new matter and is entirely supported by the
4 specification and drawings as originally filed in the '506 patent, for the following reasons.
5 MPEP 2163.06 specifically refers to the issue of the relationship of the written description
6 requirement to new matter. This portion of the MPEP states that "information contained in *any one*
7 of the specification, claims or *drawings* of the application as filed may be added to any other part of
8 the application without introducing new matter" (emphasis added).

9 With respect to peripheral edges, such peripheral edges are not new matter because each
10 Figure in the '506 patent that shows a simple plate clearly shows that the perimeter of the simple
11 plate is defined by a peripheral edge having a finite thickness extending between the substantially
12 parallel opposed planar surfaces, and none of these peripheral edges that are shown include an
13 opening. The Figures of the '506 patent thus provide support for the recitation in the claims as
14 amended above, of simple plates having peripheral edges that do not include openings. Figures from
15 the '506 patent showing simple plates have been added to the present application, as noted in regard
16 to the above amendment.

17 With respect to heat exchangers not being in fluid communication with fluid passages for
18 reactants, products, or mixing and reaction volumes, the Figures of the '506 patent clearly show heat
19 exchangers that are not in fluid communication with fluid passages for reactants, products, or mixing
20 and reaction volumes. Thus, the '506 patent reasonably conveys to one of ordinary skill in the art
21 that the heat exchangers in the exemplary reactor described and illustrated in the '506 patent are not
22 in fluid communication with fluid passages for reactants, products, and mixing and reaction volumes.
23 Figures from the '506 patent showing heat exchangers and fluid passages have been added to this
24 application by the amendment presented above.

25 The amendments to the specification of the present application are therefore entirely
26 consistent with the parent application (i.e., the '506 patent), do not introduce new matter, and simply
27 provide literal support in the specification for amendments to the claims now introduced by
28 applicants.

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1 Amendment to the Drawings

2 Having made a claim to priority in the '506 patent in the current amendment, applicants have
3 added drawings from the '506 patent relating to an exemplary stacked plate reactor. The drawings
4 added to the present application are identical to drawings presented in the parent application (i.e., the
5 '506 patent). In particular, FIGURE 17 from the '506 patent has been added to the present
6 application as FIGURE 16, FIGURES 18A-18C from the '506 patent have been added to the present
7 application as FIGURES 17A-17C, and FIGURES 19A-19C from the '506 patent have been added to
8 the present application as FIGURES 18A-18C.

9 Rejection of Claims 1-5, 9-14, 18, 20-24, 26, and 71-74 under 35 U.S.C. § 103(a)

10 The Examiner has rejected Claims 1-5, 9-14, 18, 20-24, 26, and 71-74 under
11 35 U.S.C. § 103(a) as being obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S.
12 Patent No. 5,250,263), further in view of Agrafiotis et al. (U.S. Patent No. 5,463,564). The Examiner
13 admits that Bard does not disclose the recited reaction database, but indicates that it would have been
14 obvious to incorporate similar databases, as disclosed by Agrafiotis. The Examiner further admits
15 that Bard does not disclose a stacked plate reactor, but asserts that the stacked plate reactor disclosed
16 by Manz is an equivalent structure, and therefore indicates that substitution of Manz's stacked plate
17 reactor for Bard's chip reactor would have been obvious. Applicants respectfully note that the claims
18 as amended above, distinguish over the art cited for the following reasons.

19 Applicants have amended independent Claims 1 and 71 to recite a stacked plate reactor that is
20 distinguishable from the stacked plate apparatus disclosed by Manz. Because the cited art does not
21 teach or suggest a stacked plate reactor equivalent to the stacked plate reactor recited in the amended
22 claims, the combination of references suggested by the Examiner cannot achieve an equivalent
23 invention. Nor is there any evidence that one of ordinary skill in the art would have been motivated
24 to modify the stacked plate apparatus disclosed by Manz to achieve a stacked plate reactor equivalent
25 to that defined by applicants' claims.

26 The stacked plate reactor defined in Claim 1 (as amended) comprises "*a plurality of simple*
27 *plates stacked in layers, each simple plate having at least one opening that extends therethrough, an*
28 *opening in each simple plate overlapping at least one other opening in an adjacent simple plate,*
29 *thereby forming at least one passage within the apparatus for each of said plurality of reactants,*
30 *such passages merging within the apparatus to form a reaction chamber, the chemical product being*

1 *formed within said reaction chamber by a reaction between said plurality of reactants, the plurality*
2 *of simple plates including plates of different thicknesses, such that each simple plate disposed at an*
3 *uppermost layer and a lowermost layer in the apparatus is substantially thicker than each simple*
4 *plate disposed between the uppermost layer and the lowermost layer.*”

5 Applicants have specifically defined the term “simple plate” as a plate that does not include
6 any surface features (such as grooves) that do not completely penetrate the simple plate. A plurality
7 of these simple plates are stacked together such that overlapping openings in adjacent simple plates
8 define fluid passages, including a fluid passage for a first reactant and a fluid passage for a second
9 reactant. The fluid passages merge in the stacked plate reactor to form a reaction chamber.

10 The Examiner has admitted that the plates disclosed by Manz include fluid passages defined
11 by grooves that do not penetrate both the first and second planar surfaces of a stacked plate, as well
12 as fluid passages defined by openings, which do penetrate both the first and second planar surfaces of
13 a stacked plate. However, Claim 1 specifically recites a stacked plate reactor in which *an opening in*
14 *each simple plate overlaps at least one other opening in an adjacent simple plate.* The structure
15 disclosed by Manz includes some plates that are simple plates (i.e., plates that do not include any
16 surface features such as grooves) and some plates, which are not simple plates (i.e., plates that do
17 include grooves). In the stacked plate structure disclosed by Manz, some of the simple plates (i.e.,
18 plates that do not include any surface features such as grooves) are stacked so that they are at
19 adjacent to plates that include grooves (i.e., adjacent to plates that do not meet the definition of a
20 simple plate). Thus, the structure disclosed by Manz cannot meet the required recitation of “*an*
21 *opening in each simple plate overlaps at least one other opening in an adjacent simple plate.*” Manz
22 does not teach or suggest that a plurality of plates could or should be arranged so that each plate
23 which includes openings but not grooves is adjacent only to another plate that includes openings but
24 not grooves. There is no evidence that one of ordinary skill in the art would have been led by any
25 teaching or suggestion in the cited art to modify the stacked plate structure disclosed by Manz to
26 achieve the stacked plate reactor recited in Claim 1 (as amended). Thus, the combination of
27 references suggested by the Examiner cannot achieve an invention equivalent to applicants’ claimed
28 invention.

29 Dependent claims are patentable for at least the same reasons as the claims upon which they
30 depend, and thus, Claims 2-14, 16-18, 22-24, 26 and 74 are also patentable (Claims 19-21 having

1 been canceled by the above amendment). Accordingly the rejection of Claims 1-14, 16-18, 22-24, 26
2 and 74 as being obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent
3 No. 5,250,263), further in view of Agrafiotis et al. (U.S. Patent No. 5,463,564), should be withdrawn.

4 Claim 71 as amended also specifically recites a stacked plate reactor in which "*an opening in*
5 *each simple plate overlapping at least one other opening in an adjacent simple plate*". As noted
6 above, such a structure is distinguishable over the stacked plate structure disclosed by Manz. Thus,
7 the combination of references suggested by the Examiner cannot achieve an equivalent invention.
8 Since dependent claims are patentable for at least the same reasons as the claims upon which they
9 depend; Claims 72 and 73, which depend on Claim 71, are also patentable. Accordingly the rejection
10 of Claims 71-73 as being obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S.
11 Patent No. 5,250,263), further in view of Agrafiotis et al. (U.S. Patent No. 5,463,564) should be
12 withdrawn.

13 Claim 4 has been amended to recite additional detail relating to the pump module. As
14 amended, Claim 4 defines a pump module comprising "*a housing enclosing a first reactant pump, a*
15 *second reactant pump, a heat transfer media pump, a data and power bus, a first valve configured to*
16 *selectively couple the first reactant pump in fluid communication with a solvent supply and a first*
17 *reactant supply, and a second valve configured to selectively couple the second reactant pump in*
18 *fluid communication with the solvent supply and a second reactant supply.*" While it is true that
19 pumps and valves are known to the art, the cited art does not teach or suggest an equivalent pump
20 module enclosing the *specific* combination of pumps and valves recited in Claim 4, nor is there any
21 evidence that the pump module specifically defined in Claim 4 would solve any problem recognized
22 in the art, so that an artisan of ordinary skill might have been led to achieve the claimed pump
23 module. Claim 4 therefore distinguishes over the cited art for this additional reason. The amendment
24 to Claim 4 necessitated the amendments (for reasons of consistency) of Claims 18, 22, 24, each of
25 which depends from Claim 4, and these claims are distinguishable over the cited art for at least the
26 same reasons as Claim 4.

27 Rejection of Claims 6-8 under 35 U.S.C. § 103(a)

28 The Examiner has rejected Claims 6-8 under 35 U.S.C. § 103(a) as being obvious over Bard
29 (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263), further in view of
30 Agrafiotis et al. (U.S. Patent No. 5,463,564), and Ghosh (U.S. Patent No. 5,961,932). The Examiner

1 admits that the combination of Bard/Manz/Agrafiotis does not disclose the recited capillary residence
2 time chamber, but indicates that it would have been obvious to incorporate similar elongate residence
3 time chambers, as taught by Ghosh.

4 However, Claims 6-8 depend on Claim 1, which for the reasons discussed above, is
5 distinguishable over the combination of references suggested by the Examiner. Because dependent
6 claims are patentable for at least the same reasons as the claims from which they depend, Claims 6-8
7 are also patentable. Accordingly, the rejection of Claims 6-8 under 35 U.S.C. § 103(a) as being
8 obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263), further
9 in view of Agrafiotis et al. (U.S. Patent No. 5,463,564), and Ghosh (U.S. Patent No. 5,961,932),
10 should be withdrawn.

11 Rejection of Claims 16, 17, and 19 under 35 U.S.C. § 103(a)

12 The Examiner has rejected Claims 16, 17, and 19 under 35 U.S.C. § 103(a) as being obvious
13 over Bard (U.S. Patent No. 5,580,523), in view of Manz (U.S. Patent No. 5,250,263), further in view
14 of Agrafiotis et al. (U.S. Patent No. 5,463,564), and further in view of Ashmead (U.S. Patent
15 No. 5,534,328). The Examiner admits that the combination of Bard/Manz/Agrafiotis does not
16 disclose the heat transfer structures recited by applicants in these claims, but indicates that it would
17 have been obvious to incorporate similar structures, as disclosed by Ashmead. Claim 19 has been
18 canceled in the present amendment, but Claims 16 and 17 are patentable for the following reasons.

19 As filed, Claim 17 recited fluid paths for heat transfer media configured in at least one of a
20 parallel configuration and a serial configuration. The Examiner has noted that Ashmead discloses
21 fluid paths for heat transfer media in a parallel configuration. Applicants have amended Claim 17 to
22 delete reference to a parallel configuration and only recite a serial configuration. The cited art does
23 not teach or suggest fluid paths for heat transfer media arranged in a serial configuration, nor is there
24 any evidence that it would have been obvious to one of ordinary skill in the art to modify the parallel
25 heat transfer media fluid path configuration disclosed by Ashmead to achieve the serial heat transfer
26 media fluid path configuration recited in this claim. Claim 17 is therefore distinguishable over the
27 cited art.

28 Furthermore, Claims 16 and 17 each depend on Claim 1, which as discussed above, is
29 distinguishable over the combination of references suggested by the Examiner. Because dependent
30 claims are patentable for at least the same reasons as the claims from which they depend, Claims 16

1 and 17 are also patentable. Accordingly, the rejection of Claims 16 and 17 under 35 U.S.C. § 103(a)
2 as being obvious over Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No.
3 5,250,263), further in view of Agrafiotis et al. (U.S. Patent No. 5,463,564), and Ashmead (U.S.
4 Patent No. 5,534,328), should be withdrawn.

5 Rejection of Claims 75-77 under 35 U.S.C. § 103(a)

6 The Examiner has rejected Claims 75-77 under 35 U.S.C. § 103(a) as being obvious over
7 Bard (U.S. Patent No. 5,580,523) in view of Manz (U.S. Patent No. 5,250,263). The Examiner
8 admits that Bard does not disclose a stacked plate reactor, but asserts that the stacked plate apparatus
9 disclosed by Manz is an equivalent structure, and on that basis, the Examiner concludes that
10 substitution of Manz's stacked plate reactor for Bard's chip reactor would have been obvious.
11 Applicants respectfully disagree for the following reasons.

12 Applicants have amended independent Claim 75 to recite a stacked plate reactor that is
13 distinguishable from the stacked plate apparatus disclosed by Manz. Because the cited art does not
14 teach or suggest a stacked plate reactor equivalent to the stacked plate reactor recited in the amended
15 claims, the combination of references suggested by the Examiner cannot achieve an equivalent
16 invention. Nor is there any evidence that one of ordinary skill in the art would have been motivated
17 to modify the stacked plate apparatus disclosed by Manz to achieve a stacked plate reactor equivalent
18 to that defined by Claim 75.

19 The stacked plate reactor defined in Claim 75 (as amended) comprises "*a plurality of simple
20 plates stacked in layers, each simple plate having at least one opening that extends therethrough, an
21 opening in each simple plate overlapping at least one other opening in an adjacent simple plate,
22 thereby forming at least one passage within the apparatus for each of said plurality of reactants,
23 such passages merging within the apparatus to form a reaction chamber, the chemical product being
24 formed within said reaction chamber by a reaction between said plurality of reactants, at least one
25 heat exchanger being defined by an opening in at least one simple plate, and at least one simple plate
26 immediately adjacent to an opening defining at least one of the at least one heat exchanger having a
27 thickness of at least about 0.2 millimeters and not more than about 0.6 millimeters.*"

28 Claim 75 as thus amended specifically recites a stacked plate reactor in which "...an
29 opening in each simple plate overlapping at least one other opening in an adjacent simple
30 plate...." As noted above, such a structure is distinguishable over the stacked plate structure

1 disclosed by Manz. Thus, the combination of references suggested by the Examiner cannot achieve
2 an equivalent invention.

3 Furthermore, Claim 75 as amended specifically recites that *"at least one simple plate*
4 *immediately adjacent to an opening defining at least one of the at least one heat exchanger having a*
5 *thickness of at least about 0.2 millimeters and not more than about 0.6 millimeters."* The cited art
6 does not teach or suggest a stacked plate reactor including at least one simple plate having the recited
7 dimensional configuration. The stacked plate reactor recited in Claim 75 is distinguishable over the
8 cited art for this additional reason.

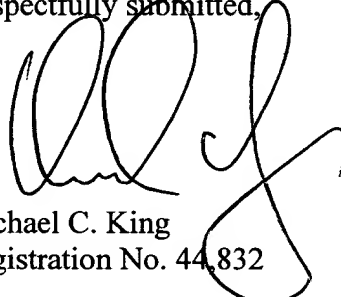
9 Claim 76 specifically recites a stacked plate reactor *"wherein each chemical reactant inlet*
10 *port, inlet pathway, reaction chamber and product outlet port comprises an opening through at least*
11 *one simple plate aligned with at least a portion of an opening through an adjacent simple plate."* As
12 discussed above in detail, the stacked plate structure disclosed by Manz includes some plates that are
13 simple plates (i.e., plates that do not include any surface features such as grooves) stacked such that
14 they are adjacent to plates that include grooves (i.e., plates that do not meet the definition of a simple
15 plate). Manz uses a combination of simple plates (i.e., plates that do not include any surface features
16 such as grooves) and plates that do include surface features such as grooves to define fluid paths in
17 the stacked plate device. This configuration of Manz is not equivalent to applicants' claimed stacked
18 plate reactor in which the fluid paths, reaction chambers and inlets/outlet are defined by aligned
19 openings in *adjacent* simple plates. Manz does not teach or suggest that a plurality of plates should
20 be arranged so that each plate that includes openings but not grooves is adjacent only to another plate
21 that includes openings but not grooves, and there is no evidence that one of ordinary skill in the art
22 would have obviously been led to modify the stacked plate structure disclosed by Manz to achieve
23 the stacked plate reactor recited in Claim 76. Thus, the combination of references suggested by the
24 Examiner do not achieve a configuration equivalent to applicants' claimed invention.

25 The system recited in Claim 77 includes a frame, which as amended comprises *"a plurality of*
26 *plates, at least one of which is fixed in position, and at least one of which is moveable, the at least*
27 *one moveable of the plurality of plates enabling the reactor to be removed from the mounting frame."*
28 This configuration is schematically illustrated in FIGURES 10 and 11 of the application as filed, and
29 is described in detail in the portion of the specification (as filed) corresponding to FIGURES 10
30 and 11. The cited art does not teach or suggest an equivalent frame; thus, the combination of

1 references suggested by the Examiner does not achieve an equivalent of applicants' claimed
2 invention.

3 In consideration of the preceding remarks set forth above, it is apparent that all claims in the
4 present invention define a novel and non-obvious invention. Therefore, the Examiner is requested to
5 pass this case to issue at an early date. In the event that any further questions remain, the Examiner is
6 requested to telephone applicants' attorney at the number listed below.

7 Respectfully submitted,

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10
11 Michael C. King
12 Registration No. 44,832

13 MCK/RMA:klp
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15 EXPRESS MAIL CERTIFICATE


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Date of Deposit: May 4, 2005

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